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CONCEPTS OF OPERATIONS FOR POSTATTACK FIRE PROTECTION OPERABILITY

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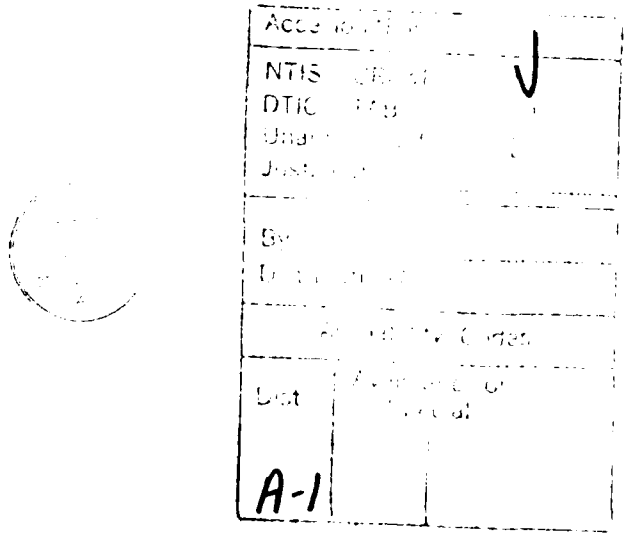

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This document outlines the expected postattack environment firefighters will face during wartime operations. It defines doctrine and procedures to guide decision makers with principles for fire protection to support the launch, recovery, and sustained combat air operations. The report discusses the elements that constitute the fire protection system and its mission during war. The report outlines the necessary planning, training, and system improvements required for firefighters to effectively conduct postattack operations that will have a major and lasting impact on the generation of air combat sorties. The document discusses the force structure, available vehicles, and spares for wartime operations. The report also outlines survival and recovery procedures for fire protection in the preattack, postattack, and reattack phases.

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PREFACE

This report was prepared by the BDM Corporation, 7915 Jones Branch Drive, McLean, Virginia 22102, under Contract F08635-84-C-0185, for the Air Force Engineering and Services Center, Engineering and Services Laboratory, Tyndall Air Force Base, Florida 32403.

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This report has been reviewed by the Public Affairs Office (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nationals.

This technical report has been reviewed and is approved for publication.

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SECTION I

INTRODUCTION

A. OBJECTIVE

The objective of the Concept of Operations is to define doctrine and procedures to guide commanders and fire protection personnel at all levels in protecting base assets from attack. It will provide decision makers with firefighting principles to support quick-response launching, recovering, and sustaining combat air operations.

The fire protection practices outlined herein should be integrated into local Air Base Operability (ABO) organizations and must be responsive to the commander's primary requirement to launch sorties.

B. BACKGROUND

During wartime and contingency operations, USAF firefighting forces are a primary ABO asset and must protect people, aircraft, facilities, materials, and equipment from the effects of fire caused by aircraft battle damage and enemy weapons effects. In general, extensive facility, utility, and runway/taxiway damage is expected from tactical munitions, such as iron bombs, penetrators, and cluster munitions. Under these circumstances, the Installation Commander will face a critical long-term structural fire situation, particularly if petroleum, oil, and lubricant (POL) storage and large warehousing structures are damaged. At the same time, the fire department will be required to meet high-intensity fire suppression and rescue requirements generated by aircraft ground incidents, as well as to provide firefighting and crash-rescue response to returning aircraft.

The primary task of the Wing Commander during war is to employ the firefighting force where it will contribute the most to generating air combat sorties during the conflict, while minimizing risks to fire protection personnel, vehicles, materials, and equipment.

The rules for postattack fire protection operations will differ radically from the peacetime procedures of rapid response and quick extinguishment of all fires. The presence of chemical agents, munitions, and submunitions with time-delayed or target-sensitive fusing is highly probable in the postattack environment and will complicate fire suppression and rescue-response strategies and procedures.

C. SCOPE/APPROACH

This Concept of Operations supports the overall base-level ABO organization, planning, and policy for wartime operations. Concepts can be tailored by Major Commands (MAJCOMs) and base planners according to specific threat, mission, and location requirements.

SECTION II

FIRE PROTECTION OPERATIONAL SYSTEM

A. FIRE PROTECTION ELEMENTS

The postattack fire protection system consists of all elements that contribute to the survivability and operability of the firefighting force. These elements include:

1. Physical protection: Survivable Collective Protection System (SCPS), splinter protection, and vehicle armoring;

2. Vehicles: crash, structural, rescue, command/control, and support;

3. Firefighters: trained and capable;

4. Ancillary equipment: proximity suits, self-contained breathing apparatus (SCBA), recharging apparatus for SCBA, chemical warfare individual protective equipment, War Readiness Spares Kit (WRSK), and War Reserve Material (WRM);

5. Consumable materials: agents and water;

6. Installed systems: detection and suppression;

7. Communications: base stations, mobile and repeater units;

8. Essential support: vehicle maintenance/spares, fuel, food service, and medical;

9. Training: priorities, tactics, strategies, and procedures.

B. FIRE PROTECTION MISSION

The preattack fire protection mission is to eliminate or reduce the fire threat to personnel, aircraft, and facilities before the attack and to provide postattack suppression and rescue response to fire-crash incidents that most seriously jeopardize the base's combat sortie generation capability.

In the postattack environment, the fire department will be faced with numerous fires, extensive damage, and injured personnel requiring emergency rescue and medical care. The task of getting to firefighting and rescue locations will be complicated by unexploded ordnance (UXO), craters, pavement damage and facility debris. Firefighting and rescue must be accomplished with fixed numbers of people, equipment, and materials in a chemical warfare environment. Attrition can be expected to steadily decrease the availability of firefighters, fire vehicles, and agent levels. Commanders must decide which fires to fight, which fires to let burn, which people to rescue, and which people to leave to buddy care. These and other decisions will affect

the launch and recovery of aircraft, response to returning battle-damaged aircraft, and the operation of both fixed and mobile aircraft-arresting systems (AAS).

The Fire Chief should be located in the Survival Recovery Center (SRC) to maximize the information available for the employment of fire suppression and rescue forces. However, at MAJCOM direction, the Fire Chief can be located in the Damage Control Center (DCC). The Fire Chief directs the allocation of firefighting resources in concert with command priorities and concurrent ABO/Base Recovery After Attack (BRAAT) operations.

1. Postattack Environment

Extensive analysis of the postattack environment has been conducted over several years. The results of this effort permit the characterization of the expected situation following an attack on a Main Operating Base (MOB). This document can be used for war planning and training and should be adapted to local conditions, based on unique Wing or theater-level requirements. The expected postattack firefighting environment is as follows:

a. Mass fires will not occur. Fires from conventional high-explosive ordnance can be expected at a rate of 0.005 ignitions per 1000 square feet of damaged facility floor area.

b. One of every five returning mission aircraft will require fire department response under wartime conditions.

c. Fire-storms will not occur.

d. The fire department will not have the resources to attack and extinguish all structural fires, respond to all rescue situations, and support all aircraft incidents simultaneously.

e. Water distribution lines will be severely damaged and hydrant water supplies will be inadequate.

f. Fire department resources (personnel, vehicles, equipment, and consumables) will be repeatedly depleted by weapons effects unless physical protection is provided.

g. Fire department response to aircraft recovery operations from AAS engagements on the Minimum Operating Strip (MOS) will be a major wartime commitment and will severely limit other support.

h. Fire department response will be delayed by UXO and craters/debris in roads, taxiways, and runways. Commitment of unprotected, nonarmored firefighting assets in an undefined UXO environment will increase the risk of attrition significantly.

2. Postattack Needs

Based on the projected postattack environment, the following minimum needs can be expected:

a. Critical fire department support resources must be protected and wartime procedures must be established. This includes WRSK, vehicle maintenance, food service, and SCPS operations.

b. Specific fire suppression and rescue responses must be ranked, based on their relative value to sortie generation.

c. Automatic fire suppression systems and the removal of ignition and fuel sources from facilities are the most effective means to reduce the postattack fire response and rescue workload.

d. Occupants of critical sortie generation facilities should be trained to extinguish or contain fires until fire department assets arrive.

3. Planning and Training

Planning and realistic training is essential to effective postattack operations of lasting value to generating air combat sorties. Planning and training must reflect a sound understanding of expected fire response situations from conventional attack. These key essential elements are:

a. Fire Spread

Fire spread within the aircraft shelter complex is unlikely because of the distance between the hardened shelters. Fire spread from one munitions storage facility to another is unlikely, because of the distance between the facilities and their concrete, earth-covered construction. The involvement of more than one storage igloo may result from a detonation of stored munitions.

Fire spread from one base structure to another in the cantonment areas is possible, although less probable than in World War II, because the facilities do not have the surface density of wood to support sustained fire spread or fire-storms.

When fuel tanks are ignited, unburned fuel should be pumped or drained from the tank, if the distribution system remains relatively intact and if a receiver for the fuel is available. Such action will reduce extinguishment time and result in a shorter burn time, if the tank is allowed to burn until self-extinguishment occurs. Draining the tank away from other storage tanks can reduce the risk of fire spread.

b. Damaged Facility Fires

Success in stopping fire spread depends on the number of vehicles and personnel, their capabilities, and how rapidly firefighters engage the fires. Firefighting is impractical when burning buildings are

exposed to neighboring fires from which heat is sufficiently intense to sustain the fire and reignite the building. When fires have spread through a major portion of a building, (including the spaces between the walls), the structure will probably burn completely and cease to be a further fire threat in less time than it would take to extinguish the fire.

Blast-damaged structures can be expected to burn in one-third to one-half the time required for undamaged structures. If a significant loss of compartment integrity occurs (as in the case of a bomb-damaged facility), the fire will spread faster than it would have in the undamaged structure. Blast damage will change the fire environment and provide easy routes for fire propagation to adjacent compartments. Fire spread in the damaged buildings will be rapid and simultaneous, in all directions, with large flame areas. Both the intensity of the fire and the need for fire suppression will be lessened by keeping the fire from penetrating into concealed spaces.

Base augmentees who work in mission-essential, critical facilities, must be trained in self-help firefighting to support Fire Department operations. The level of self-help training should be determined by the MAJCOM in the theater of operations.

c. Vehicle Operability

Fire vehicle operability in the postattack environment is critical to aircraft sortie generation; therefore, spare parts for fire vehicles should be pre-positioned and protected from weapons effects. Vehicle attrition in a wartime environment demands that operational vehicles remain in service until damaged vehicles are repaired or replaced. The wartime spare parts pipeline is expected to be in disarray, and on-hand bench stock and special levels will only be able to sustain the fleet for a short time.

Major components or subsystems expected to fail must be identified, stocked, and protected at all MOBs. Vehicle maintenance Battle Damage Repair must be available for immediate support for the firefighting fleet.

During ABO operations, fire vehicle maintenance and repair must be accomplished as quickly as possible. Repairs should consist of component removal and replacement, rather than lengthy trouble-shooting and repair. This can be planned for in advance with WRSK and base supply special levels.

d. Explosive Ordnance Disposal

Explosive ordnance disposal (EOD) personnel will not be immediately available to clear response routes from the dispersed location to fire and rescue sites. Therefore, at MAJCOM direction, it may be necessary to provide limited training to firefighters in the EOD function. The level of EOD training should be limited to submunitions (such as antipersonnel) and should not exceed what is required to clear a fire vehicle response route.

e. Chemical Warfare (CW) Defense

Procedures and training for firefighting in a CW environment will require reassessment upon introduction of the combined CW-firefighter ensemble.

C. FORCE STRUCTURE

HQ AFESC/DEF, MAJCOMS, and local commanders will determine the availability of manpower and equipment for overseas MOBs, Collocated Operating Bases (COBS), Central Tactical Air Force locations, and Aerial Ports of Debarkation. As fire protection combat attrition takes place, MAJCOMs may consider reallocation of resources to ensure adequate support at priority locations.

Based on current and projected authorizations, each MOB can expect approximately 70 military firefighters upon mobilization. The full complement of fire protection personnel will be comprised of in-place forces, plus additional Prime BEEF forces.

The basic allocation of fire vehicles consists of three to four major crash trucks (P-2, P-4, P-19), two rapid-intervention vehicles (P-13, P-20), one rescue vehicle (P-10), two structural pumpers (P-8, P-12), two command and control vehicles (4 by 4, carryall), and support equipment, such as a water carrier (P-18). Based on mission, and sometimes WRM requirements, one to three additional major crash vehicles may be available. These additional vehicles are based on the expected aircraft sortie rate and additional equipment may be available from the host nation. Firefighters should be trained and able to operate host nation equipment.

D. OPERATIONS

Each overseas installation will have a trained and capable firefighting force to support wartime tasks. Firefighters will be tasked with multiple fires and they will have neither the equipment nor the personnel to fight and extinguish all fires simultaneously. It is expected that most fires will have progressed beyond their point of origin before UXOs are located and firefighters can leave splinter-protected areas. Immediately following an attack, fire vehicles may have to take exceptionally long response routes to minimize exposure to UXOs. If direct routes are specified by commanders the risk of attrition will be increased significantly.

As ABO operations progress through the various phases, significant attrition of firefighters, equipment, and agents can be expected. The preattack, transattack, postattack, and reattack phases of ABO, and fire department involvement in these phases should be planned and trained for separately. MAJCOMs and commanders at all levels should supplement this concept with guidance applicable to their missions and theaters of operations. ABO plans should provide a smooth transition to recovery operations following an attack and should address the transition to ABO in environments where communications are intact, interrupted, or totally destroyed.

1. Preattack

The preattack phase begins approximately 20 days before the expected attack. Preparation during the preattack phase will include two distinct efforts: planning, and dispersal and physical protection. During the preattack phase, fire department forces should implement the following plans developed by their MAJCOM, local ABO, and fire department organizations:

a. Planning

(1) Survey water supplies for use during postattack, including both onbase and offbase sources (swimming pools, cooling towers, reservoirs, tankers, pumps, wells, etc.). Construct expedient access routes to auxiliary water, as necessary. Establish a supply of pumps, hoses, and equipment for rapidly replenishing water where hydrants are not available.

(2) Survey the base terrain for naturally protected areas for fire vehicles, agents, equipment, and personnel. Use ditches, hillsides, and trenches for maximum protection.

(3) If required, identify locations where expedient construction could be used to quickly provide splinter protection for fire vehicles, agents, and personnel. Earth berms or bermed revetments are effective and are rapidly constructed.

(4) Coordinate with POL personnel to ensure that enough fuel remains in floating-roof tanks to keep the roof above the lower roof supports, thereby, reducing the probability of fragments igniting aboveground POL tanks. Provide drainage ditches and holding areas around POL areas to prevent spilled fuel from endangering other tanks. Survey possible fuel holding or tank drainage diversion areas where spilled fuel could burn without endangering other critical fuel supplies.

(5) Identify all "safe" areas where munitions are not expected to impact. Disperse assets, such as fuel and spare parts, into these areas.

(6) Perform an inventory of all agents and other critical equipment and supplies. If shortages exist, submit high-priority requests for additional agents and equipment expected to be required. Obtain stocks from local sources.

(7) Develop a battle management kit containing plans, tactics, and strategies to cope with the postattack environment. Command and control of the firefighting forces must receive particular attention during this training. Train on these procedures to the maximum extent possible.

(8) Establish firefighting procedures for a chemical warfare environment. Assume that the attack will include chemicals until proven otherwise, and train personnel using these procedures.

(9) Review and refine the facility priority listing. The facility priority system must severely restrict the number of facilities absolutely critical to sortie generation that will require suppression or rescue response.

(10) Coordinate with vehicle maintenance for the expedient repair of fire vehicles.

(11) Inspect installed alarm systems not connected to the central fire department automatic fire alarm receiver to ensure that the systems are in service. This is required to ensure fire detection and suppression systems not connected to the receiver are in service and can be expected to function as designed. Inspect all automatic suppression to ensure that valves are in the required positions and that the system will function as designed. Restore any system shut down for repairs, to service if possible. If this is not possible plug lines, bypass valves, etc., to partially return the system to service.

(12) Establish duty and SCPS hours and crew change procedures. Determine the location of the SCPS where firefighters will be housed and establish food service, rest, relief, and processing areas. To reduce the exposure of both firefighters and fire vehicles, firefighters should be housed in four or five separate SCPS remote from each other. The SCPS where firefighters are housed should be located close to their dispersed location.

(13) Coordinate with the MAJCOM and local fire officials for replacement vehicles and agents.

(14) Deploy and pre-position fire hose, nozzles, and equipment to critical, mission-essential facilities for self-help firefighting. Train occupants thoroughly.

b. Dispersal and Physical Protection

(1) Locate dedicated splinter-protected areas for fire vehicles, agents, and personnel. These areas include the following:

(a) Hardened aircraft shelters;

(b) Earth-bermed modular revetments;

(c) Earth berms, trenches, or bermed trenches;

(d) Large earth-covered, semiburied, corrugated steel culvert sections.

(2) Disperse agents and ancillary equipment. Agent dispersal should include both fire department stock and special levels. Record the amounts and location of all dispersed equipment and materials. Disperse and locate agents in the same splinter-protected areas as the fire vehicles.

(3) Use expedient construction, providing splinter protection for halon tanks that cannot be moved.

(4) Provide splinter protection for the Fire Communications Center (FCC), the fire/crash radio net base station, and repeater units.

(5) Provide splinter protection for fire vehicle fuel supplies. Equip the tanks with hand pumps or other measures.

(6) Construct rapid-diversion draw-down drainage ditches and holding areas around POL tanks.

(7) Conduct refresher training for arriving Prime BEEF team members.

(8) Ensure the integrity of all fire walls, fire doors, and fire partitions.

(9) Conduct CW refresher training and chemical gear checkout.

(10) Conduct "fine tuning" training for crews, including "what if" and attrition of vehicles, personnel, and materials situations.

(11) Deploy and connect fire hose to standpipe systems and hydrants for self-help firefighting.

(12) Conduct refresher, self-help firefighter training for those personnel with duty locations in critical facilities. Include hose lines, hydrant, standpipe, installed system operations, and electrical, heat, and open flame shutdown.

(13) Ensure that POL dikes are intact and ground water drains are closed.

(14) Ensure the isolation of utilities and POL piping systems. The water distribution system should not be isolated or shut down. However, plans should be coordinated with water plant operators, to ensure that the system will be shut down when a line break is obvious because of a loss of pressure or larger-than-expected water flow. Water must remain on during the attack to support deluge and sprinkler systems and for standpipes and hydrants essential for self-help firefighting.

(15) Where possible, move all flammable liquids from inside facilities to outside locations.

(16) Establish equipment, charts, maps, etc., for all primary and alternate command and control centers.

(17) Locate and disperse all vehicle spare parts, WRSK, and WRM to splinter-protected areas.

(18) Disperse vehicles, spare tires, agents, personnel, and spare equipment. Traversing debris, craters, and submunitions will require several spare tires for each vehicle.

(19) Equip P-19 vehicles with hardening kits.

2. Transattack

The transattack begins with the first enemy aircraft over target and ends when the base transitions to a recovery role and begins ABO operations. The transition to ABO must begin immediately following the attack. Overseas airbases are subject to air, ground, and combined air and ground attacks, with a variety of ordnance. During the transattack, fire department personnel will be dispersed throughout the base and can observe and report airfield attack status. If possible, they must relay information to the FCC, such as the number and type of aircraft attacking base, attack intensity, and base areas receiving the most damage, fire starts, and other related information. Firefighters should be able to make general observations about the type of ordnance being used in the attack (general-purpose bombs, clusters with submunitions, or chemical weapons) and attack duration.

Fire department vehicles and personnel should remain dispersed and protected during all attack and reattack situations.

3. Postattack

Fire department operations in the postattack environment are critical to ABO and to generating combat sorties as soon as possible. Firefighting assets must be protected. Senior fire officials must be constantly aware of the need to recover combat capability and not to extinguish each fire or rescue each person in danger. After an attack, existing airbase roadways and taxiways may not be passable because of denial munitions, bomb craters, wreckage, and other debris. Therefore, fire vehicles may have to operate fully loaded off hard surfaces, in shifting sand, deep snow or mud, rocky soil, flooded area, or swamps. Such conditions will make submunition detection more difficult, and fire crews must be cautious to avoid rendering fire vehicles incapable of supporting ABO.

a. Initial Postattack Period (No Aircraft Operations)

Fire department personnel will immediately assess and report damage in their vicinity, including the presence or lack of chemicals, submunitions, and other UXO. At the conclusion of the attack, fire crews will report immediately the status of personnel, agents, and vehicles. War plans must address accomplishing this task with both normal and interrupted or nonexistent radio communications.

Firefighters will not commit fire vehicles to firefighting or rescue unless directed to do so by the Fire Chief. The Fire Chief will provide the SRC staff with a situation assessment in terms of structural and aircraft fires; UXO risk; vehicle, personnel, and agent status/attrition; water and agent availability; the presence or lack of chemicals; and pavement

damage. The Fire Chief will receive SRC/Commander direction and advise the commander on whether or not to commit fire equipment. The Fire Chief will then employ firefighting forces, as directed.

The employment of fire department assets will be based on the relative value of the response to sortie generation. Forces must be withheld for returning aircraft, AAS engagements, and aircraft-related ground incidents. This will severely limit facility suppression and rescue capabilities. However, given the choice, the Fire Chief should respond to a critical aircraft maintenance facility rather than a single burning aircraft. The outcome of the maintenance shop fire will affect many sorties, whereas the outcome of the aircraft fire may not affect future sorties.

UXOs will require firefighters to proceed with extreme caution during response from the dispersed areas. If UXOs make travel by one route impossible, alternate routes must be taken. The objective must be to take the shortest possible route with minimum UXO exposure.

To ensure that Fire Department resources are expended for maximum support of sortie generation, non-fire-related rescue operations will be carried out only at the direction of the Commander.

b. Postattack Period with Aircraft Operations Underway

Before beginning aircraft operations, crash vehicles should deploy to the MOS and shelter areas, as necessary, to support aircraft launch and recovery. Firefighters should extinguish fires, perform rescues, and help keep launch and recovery strips open. These actions will include AAS operations, coordinating with, and assistance to aircraft maintenance, civil engineering, and other ABO functions.

The MOS is the most crucial sortie-generating facility on base. Fire department involvement in AAS recovery must be planned and training must be accomplished in advance. In a one-MOS/one-AAS situation, there will be insufficient time to recover simultaneously returning aircraft that are low on fuel. Local commanders must account for this situation.

4. Reattack

It is assumed that the reattack will not be unexpected and that fire protection personnel will have at least a 5-minute attack notice. Upon receipt of the reattack notice, firefighters will cease all firefighting actions and return to splinter protection. The lack of protection for fire department assets may result in loss of aircraft, facilities, and life. This doctrine must be clearly stated and understood by all command levels. If time, distance, and UXO do not allow the return to splinter protection, crews should take advantage of the nearest available cover and ride out the attack.

During the reattack, firefighters should make the observations and reports previously addressed. At the conclusion of the reattack, recovery actions are the same as addressed previously.

SECTION III

CONCLUSIONS AND RECOMMENDATIONS

The firefighting system is a primary ABO asset during war. Fire protection must be integrated into the local ABO structure, whereby resources can be readily protected and deployed to support the commanders' primary requirement of sortie generation. Fire department involvement should be planned for and trained for separately, supplemented with guidance from each applicable MAJCOM.

Augmentees who work in mission-essential, critical facilities must be trained in self-help firefighting to support fire department operations. The MAJCOM should determine the level of self-help training.

Because EOD personnel will not be available immediately to clear fire response routes, limited firefighter training in the EOD function should be given. Minimally, the training should include clearing submunitions within a fire response route.

During ABO operations, fire vehicle maintenance and repair must be completed as quickly as possible. Spare parts for fire vehicles should be readily available and should be protected from weapons effects.

MAJCOM and base-level fire protection concepts of operations for wartime employment of the firefighting system should be established.

Ancillary equipment and agents required to operate in the postattack environment should be established.

Splinter protection for fire vehicles, personnel, communications, agents, ancillary equipment, water, and other spares should be provided. AFESC has the splinter protection design and siting underway.

AFESC also has an effort underway to design armoring for the P-19. This armoring is urgently needed, and should be fielded as soon as possible.

To ensure firefighting resources are allocated to best support sortie generation, the fire chief's postattack operating location should be in the SRC.